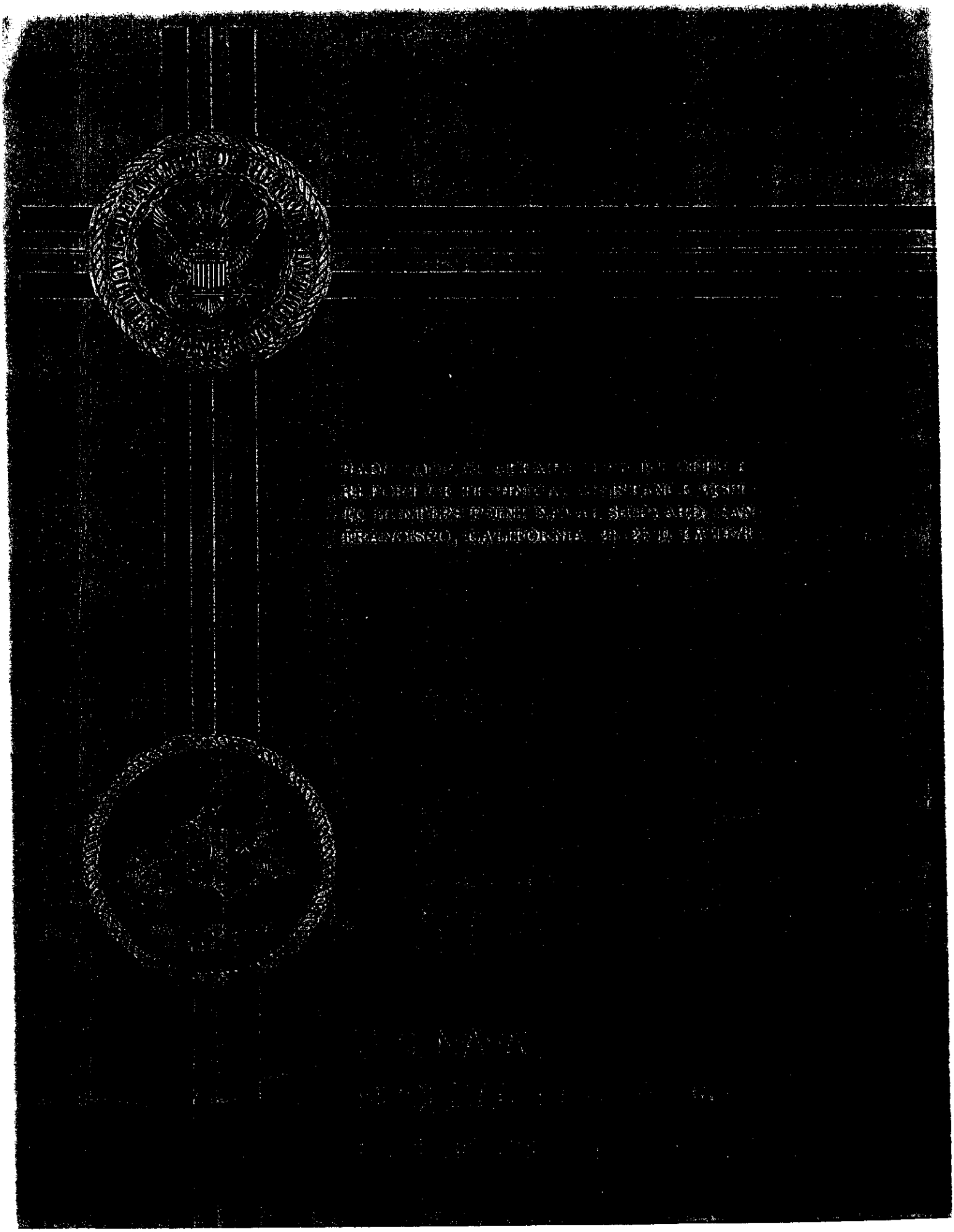

NAVAL NUCLEAR POWER UNIT
FORT BELVOIR, VIRGINIA

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RADIOLOGICAL AFFAIRS SUPPORT OFFICE REPORT OF TECHNICAL ASSISTANCE VISIT TO HUNTERS POINT NAVAL SHIPYARD, SAN FRANCISCO, CALIFORNIA, 23 - 25 JULY 1973

Prepared by Frederick C Combs
FREDERICK C. COMBS
Health Physicist
Radiological Affairs Support Office

Kenneth W. Blevins
HM2 KENNETH W. BLEVINS
Operational Health Physicist
Radiological Affairs Support Office

ABSTRACT

A Radiological Affairs Support Office (RASO) technical assistance visit was made to the Hunter's Point Naval Shipyard, San Francisco, California, during the period 23-25 July 1973 to provide advice and assistance concerning the safe use and disposal of equipment and material producing ionizing radiation. Recommendations are provided to improve the radiological safety program.

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1. DISCUSSION

In accordance with NAVMATINST 5100.8, Mr. Frederick Combs and HM2 K.W. Blevins, USN, of the Radiological Affairs Support Office (RASO) visited the radiography facility, the radiac repair facility, the instrument repair shop, the Supply Department, and the facilities of the former Naval Radiological Defense Laboratory (NRDL) at Hunter's Point Naval Shipyard (NAVSHIPYD HUNTERS PT), San Francisco, California during the period 23-25 July 1973. The purpose of the visit was to evaluate and provide advice and assistance concerning the safe use and disposal of equipment and materials producing ionizing radiation at the shipyard.

The following NAVSHIPYD HUNTERS PT personnel were involved in the visit:

a. Mr. J. PSATHAS, Supervisor, Industrial Hygienist
b. Mr. R. ASKANOS, Physical Science Technician
c. Mr. G. WATKINS, Head, Quality Assurance
d. Mr. P. ARMENTROUT, Non-Destructive Test Supervisor
e. Mr. L. KEARNEY, Radiac Coordinator
f. Mr. G. MENIZE, Foreman, Radiac Repair Facility
g. Mr. M. HASS, Electronics Mechanic, Radiac Repair Facility
h. Mr. J. KOTLARZ, Optical Foreman
i. Ms. D. HARRISON, Medical Secretary, NAVSHIPYD Dispensary

Mr. Psathas, Mr. Watkins, Mr. Armentrout, and Mr. Kearney were briefed at the beginning of the visit and Mr. Psathas was debriefed at the conclusion of the visit.

Radiation measurements were obtained with the following instruments:

a. Eberline RO-2 Ion chamber
b. AN/PDR-27R Geiger-Mueller survey instrument
c. Eberline PRM-5N/SPA-3A Gamma Scintillation survey instrument
d. Eberline PAC-4S Alpha Scintillation survey instrument.

The detailed findings of the RASO team are provided in Section II. Recommendations to improve the radiological safety program are provided in Section III.

II. FINDINGS

A. General

1. The shipyard was in the process of closing. No plans had been formulated for disposition of the isotopic radiography sources, x-ray machines, radioluminescent devices, or calibration sources being held at the shipyard.

2. The Industrial Hygiene Supervisor was designated as the Radiological Safety Officer (RSO). His formal training in radiation safety consisted of the Public Health Services courses "Basic Radiation Health" and "Occupational Radiation Protection."

3. NAVSHIPYD HUNTERS PT conducted a radiation safety training program for radiographers with refresher training required biannually.

4. Calibration, maintenance, and repair of radiac equipment was performed on a scheduled basis by the NAVSHIPYD HUNTERS PT Radiac Repair Facility.

5. Photodosimetry service was provided by National Naval Medical Center (NNMC), Bethesda. Examination of the photodosimetry program and records indicated minimal personnel exposures. DD 1141's were maintained in the individual's health records which were kept by the Dispensary.

6. Records substantiated that all leak tests, inventories, and instrument calibrations were being performed as required by AEC license no. 04-13597-01.

7. All material arriving at the shipyard was screened by the supply department with an AN/PDR-27. The Industrial Hygiene Office was notified when radioactive items were found. All ships entering NAVSHIPYD HUNTERS PT for a period of at least two weeks were screened by Mr. Askanos with an AN/PDR-27 to determine the presence of radio-luminescent devices in accordance with the Navy's radium removal program.

B. Radiography Facility, Building 113A

1. Facility description. Isotopes and x-ray machines were used in stationary and field locations to obtain radiographs. The stationary facilities were established in Building 113A. The building had two 20' by 28' concrete exposure rooms designated pit #1 and pit #2 as shown in Figure 1, Appendix A.

a. Radiography sources, x-ray equipment specification and locations are listed below:

(1) Pit #1

Sperry Model 65R002 Installed X-ray machine	300 kVp, 10 mA Maximum output and normal usage	Navy Identification number 217312411
Nuclear Systems Model 52 Multitron Gamma Projector	15 Ci of Cobalt-60 as of 10/29/70	
4 ea Technical Operations model 533 gamma projectors (designated 9, 10, 11, 12)		Held under AEC License # 04-13597-01 which expires 31 Mar 75
Camera #9	52 Ci Iridium-192 as of 4/5/73	
Camera #10	85 Ci Iridium-192 as of 5/13/73	
Camera #11	Empty	
Camera #12	45 Ci Iridium-192 as of 3/19/73	

(2) Pit #2

Seifort 300 kVp oil cooled portable x-ray machine	300 kVp, 15 mA maximum output and normal usage	Navy Identification number 217251614
2 Portable Picker Ranger 100 x-ray machines	100 kVp, 10 mA maximum output and normal usage	Navy Identification numbers 445106059, 445106060
General Electric model LX-140 portable x-ray machine	140 kVp, 5 mA maximum output and normal usage	Navy Identification number 217304061

(3) Craneway

2 ea portable Sperry Model 65R002 x-ray machines	300 kVp, 10 mA maximum output and normal usage	Navy Identification numbers 445100720 445105959

b. Safety system: Entrance to the radiography area was controlled by the radiographer. Warning lights located at the entrance to each pit were wired to Technical Operations Mark II gamma alarms in each exposure room; the light indicated the presence of fields greater than 2 mR/hr. The door to each pit was interlocked with an audible alarm system. Permissible operating conditions, beam orientations, isotopic source limitations, and copies of operating and emergency procedures for radiation safety were posted by the control station of each pit. The facility and all accesses were properly posted.

c. Normally radiography was performed between 1600 and 0800 to reduce problems of access and personnel control. During normal operations, workloads were approximately 8 to 12 hours weekly for x-ray units and 8 to 12 hours daily for isotope radiography.

d. Radiographers were required to wear film badges, self-reading pocket dosimeters and Eberline "Rad Tad" personnel alarms. Eberline E-510 or #-500B survey instruments were used by radiographers for monitoring operations. Instruments were calibrated quarterly by the NAVSHIPYD HUNTERS PT radiac repair facility.

2. Specific items

a. Surveys performed by radiographers during operations were not being recorded.

b. Neither x-ray controls nor power sources were locked when not in use.

C. Radiac Repair Facility

1. That radiac repair shop and gamma calibration site were in separate facilities. Records substantiated that leak tests and inventories were being performed as required by AEC license No. 04-13597-02 which expires 31 March 1975. A recent source inventory is listed in Appendix B.

2. Photodosimetry and radiological health services were provided by the shipyard. Radioactive waste disposal, when required, was arranged through the shipyard Industrial Hygiene Office.

3. Radiac Repair Shop

a. Instrument maintenance and repair, acceptance tests for the Navy MX-2323 strontium-90 check sources, and counting of smears were performed in Room 44 of the radiac repair shop.

b. Weekly personnel dosimetry records, keys to the calibration site and the AN/UDM-1A, and the AN/UDM-1A utilization log were maintained at the repair shop. Examination of the weekly dosimeter reports showed agreement with photodosimetry records that personnel were receiving minimal exposure.

4. AN/UDM-1A Calibration range

a. The calibration range was a one room concrete structure located on the sixth floor (roof) of Building 253. The facility was equipped with a 130 Ci cesium-137 source and a 5 Ci PuBe source (AN/UDM-5). A survey of the AN/UDM-1A was performed and the results are included in Appendix C.

b. The AN/UDM-1A was kept padlocked, and the entrance to the site was locked when not in use. When the AN/UDM-1A was in use, red warning lights located above the entrance and on the west wall alerted personnel of the radiation hazard. To control personnel access, a rope barrier was placed at the outside of a painted 2 mR/hr line prior to beginning operations. The door and both accessible sides of the site were properly posted with large radiation warning signs. High radiation area signs were posted inside the facility.

c. A lead shield was placed behind the AN/UDM-1A. The control levers were located at the operator's position behind the shield. Two status lights, located on the shield, were connected to the controls. A green light indicated the source plug was out and a red light indicated the source was exposed. Arrangement and floor plans of the calibration site are included in Appendix C.

d. Radiac Repair Facility personnel were required to wear a film badge and pocket dosimeter during calibration operations. A radiation survey was performed by the operator, prior to and during operations.

D. Gauge Repair Facility, Building 253

1. Radioluminescent devices were found in two locations on the fifth floor of Building 253 in the gauge repair shop.

a. A 15" diameter "Saltwater Depth to Keel" gauge was found on the wall in a display of gauges maintained by the repair shop. Readings were 2.5×10^5 cpm gamma and 1.8×10^6 cpm alpha on contact. The gauge was tagged with a radiation warning label.

b. A wooden crate located by the east wall contained approximately fourteen depth and pressure gauges. The crate was labeled with a radiation warning sign on the lid. Readings at the exterior of the crate and on contact of the top gauge were 2.0×10^5 cpm and 3.0 to 4.5×10^5 cpm gamma respectively.

2. Radioluminescent devices were found in two places on the sixth floor in the gauge shop.

a. A wooden pallet located in the storage area of the shop contained approximately one-dozen depth and level gauges which read 2.0×10^5 cpm gamma on contact.

b. A plastic bag, found in a cardboard box by the west wall, contained approximately one dozen Bailey LS-43 drum level indicators which read 3×10^4 cpm gamma on contact. The plastic bag had radiation warning stickers on each side.

3. None of the gauges mentioned above were found to be contaminated in excess of limits established in NAVMED P-5055.

4. Specific items: There were no definite plans for disposition of devices containing radioactive material.

E. Former NRDL Facilities

1. A report on decontaminating the NRDL facilities at the shipyard was reviewed. According to this report, the only areas left contaminated were behind Building 364. Subsequent RASO surveys with the PRM-5N/SPA-3A survey instrument did not detect activity above background. The concrete tank pit mentioned in the report contained approximately four feet of water. A sample of the water was analyzed and contained 8.85×10^{-8} Ci/ml of beta-gamma activity. There were no alpha emitters present in the sample. This concentration is below the maximum concentration permitted by AEC for beta-gamma activity.

2. A telephone conversation with a representative of Region V, Directorate of Regulatory Operations of the AEC indicated that all the NRDL facilities were capable of being released for unrestricted use. A copy of the AEC report was not available to agencies or individuals outside the Directorate of Regulatory Operations.

III. RECOMMENDATIONS

A. General

That surveys be conducted to identify any unserviceable radioactive items and components, and that unserviceable items and components be disposed of as radioactive waste. That the RSO arrange for the ultimate disposal of all radioactive wastes prior to being relieved of his duties. That the RSO assure that all radiography sources are disposed of in accordance with the AEC license. That all radioactive materials held by the radiac repair facility be disposed of in accordance with NAVELECSYSCOM directives.

B. Radiography operations

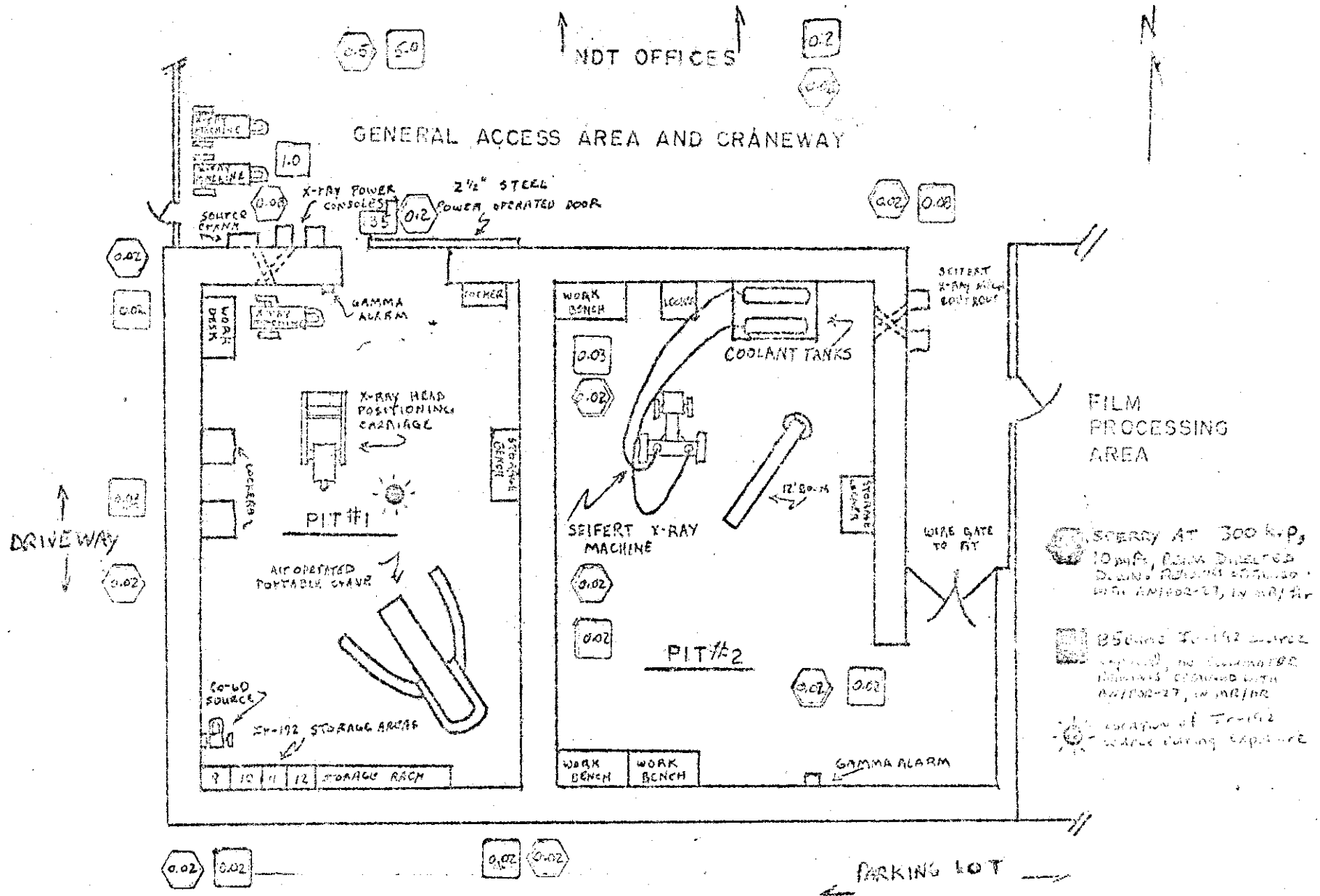
1. That surveys be recorded during all portable x-ray radiography operations. Survey records should contain a drawing of the radiography area and include such data as radiation levels, beam orientation, machine parameters, and the location of the operations. This data, along with any previously recorded data should be made available to the RSO.

2. That controls of the power to the x-ray units be locked when not in use.

C. Radiac Repair Facility. See item A above.

D. Gauge Repair Facility, Building 253

That a listing by FSN/nomenclature/quantity and condition of all items containing radioactive material be compiled and provided to the Supply Department with a request for disposition instructions.



BLDG 113A

RADIOGRAPHY FACILITIES

HUNTERS POINT NAVAL SHIPYARD

APPENDIX A

APPENDIX B

RADIAC REPAIR FACILITY, SOURCE INVENTORY, 1 JULY 1973

AEC License 04-13597-02 Amendment #1
130 curies cesium 137

AEC General License
2 ea 0.4 mCi (as of Sep 1953) strontium-90
0.05 Ci (as of March 1969) ^{90}Sr-^{88}y

Non-Licensed Sources
1 mCi of radium-226
7 Ci of radium-^{226}(MX-1083)

DOD Allotment
49.85 Ci (as of Dec 1962) plutonium-239
5 Ci (as of Aug 1968) PuBe-AN/UDM-5

Unknown numbers of the following instruments containing radioactive material were stored at the facility:

AN/PDR-18A	100 μCi	Sr-90
AN/PDR-18B	300 μCi	Sr-90
AN/PDR-43A	80 μCi	Kr-85
AN/PDR-56C	1.15 Ci	Th-232
PAC-3/GN,	3300 cpm alpha	U-238

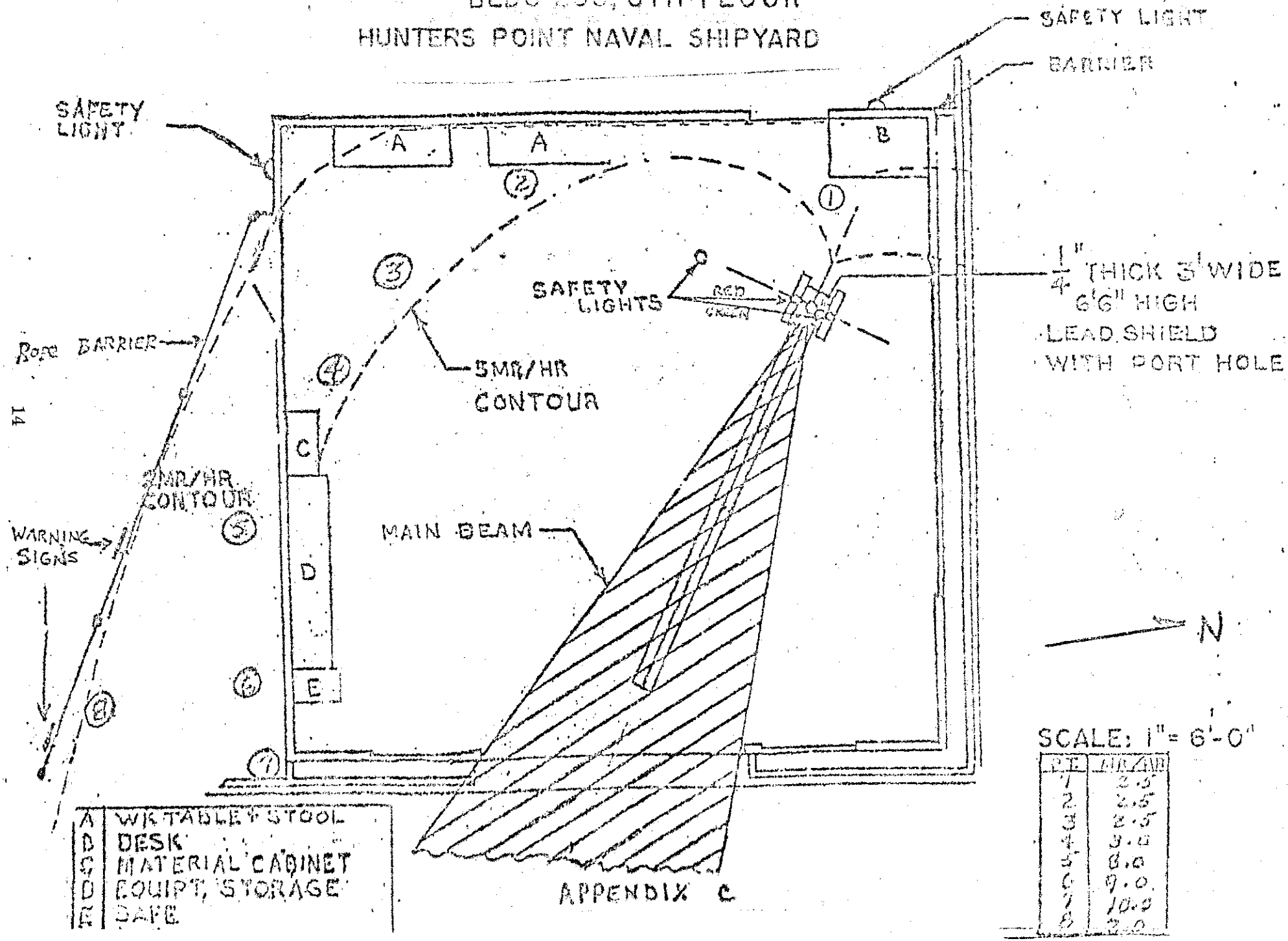
The following sources were also available:

Cs-3 check source	450 pCi Tc-99
alpha check source	3300 cpm alpha U-238
Ci-1 Calibrator	250 mCi tritium H-3
Fc #1, R3C1 & 3C2	450 pCi Tc-99

AN/UDM-1A CALIBRATION ROOM

BLDG 253, 6TH FLOOR

HUNTERS POINT NAVAL SHIPYARD



PT	AIR GAP
1	2.5
2	2.5
3	2.5
4	3.0
5	6.0
6	9.0
7	10.0
8	2.0